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ABSTRACT

Approximately 300 ninth grade Navajo boys and girls attending Intermountain School for the first time or returning after a lengthy absence participated in two projects of psychological evaluations and vision, speech, and hearing evaluations. Analysis of the psychological testing (involving achievement, aptitude, and self concept measurements) revealed that 50% of the students fell in the lowest quartile of norms for beginning seventh grade students, that the Tennessee Self Concept Scale proved unreliable, and that the Cattell Culture Fair test appeared to be the most valid aptitude measurement for the group. Results of the sensory evaluations (including tests of articulation, audiometry, vision screening, and the Peabody Picture Vocabulary Test) also indicated that the subjects scored below the available normative data in every area. (RD)

ED046141

FINAL REPORT

PROJECT IN/SLIP

(INTERMOUNTAIN SCHOOL LEARNER IDENTIFICATION PROGRAM)

CONDUCTED BY

UTAH STATE UNIVERSITY FOUNDATION

AUGUST, 1970

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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PROJECT IN/SLIP

(Intermountain School Learner Identification Program)

The following report of Project In/Slip is divided into two major sections: (1) report of the psychological evaluation; and, (2) report of the vision, speech, and hearing evaluation.

I. Psychological Evaluation

Sample

The samples tested consisted of approximately three hundred ninth grade Navajo boys and girls who were either attending Intermountain School for the first time or returning after a year or more absence. The frequency range of the sample on all tests was 101 to 140 girls and 98 to 155 boys. The variation in sample size was due to difficulty in getting students to report to the testing areas.

Purposes and Objectives

The general purpose of the psychological study was to provide:

1. Navajo Indian educators at Intermountain School with an estimate of a particular student's ability (IQ) as compared with other Indian students in relation to the acquired learning, (achievement test scores and grades) of the compared students. Thus, as is possible in middle class public schools, Indian educators will be able to determine if a particular student is learning on a level commensurate with his ability as compared within his own peer group.
2. Navajo Indian educators with a means of identifying potential emotional problems of their students.

3. A means for improving the curriculum.
4. A comparison between ninth grade Navajo, and a normal population relative to IQ, achievement, and self-concept.

More specifically the objectives were:

1. To establish normative data for Navajo Indian ninth grade students at Intermountain School relative to the following tests: Lorge-Thorndike, California Achievement Test, Cattell Culture Fair Intelligence Test, Goodenough-Harris Drawing Test, Raven Progressive Matrices, and the Tennessee Self-Concept Scale.
2. To ascertain the useability of the Tennessee Self Concept Scale and the predictive validity of achievement and ability tests for the ninth grade Intermountain Student.
3. To determine areas of academic competence and deficiency.
4. To create a student data profile sheet on each student listing achievement, ability, and personality test scores. In addition to creation of the profile sheet, the predictive and normative data will provide the investigator with material to develop a guide for teacher-counselor meaningful utilization of the data contained on the student profile sheet.

Method and Design

The tests were administered to the students according to the schedule outlined in Appendix II. Students were randomly assigned to groups and the schedule for the groups was set up so that the tests were administered in a different order for each group. The administration of the tests was conducted by graduate students in psychology or lay people trained to do group testing.

The original testing schedule provided for 2½ hours of testing per group per day while the time faction of the make-up schedule varied according to the tests missed. The dates selected were early enough in the school year that cultural and educational sophistication was minimal, but allowed enough time for the students to be oriented in their new environment.

The achievement tests were readministered during the final month of the school year in order to develop an achievement predictive equation from the achievement and scholastic aptitude test batteries.

Analysis

Based upon the results of the fall testing, norm tables were developed. Norm tables are presented in standard score units and percentile ranks. A Multiple Regression analysis was performed to construct a predictive equation that might predict the academic achievement of 9th grade students of Intermountain School. Achievement growth of students was also determined by analyzing the pre-post on the California Achievement Tests.

Results and Discussion

Achievement Tests. The norm tables for the Intermountain Indian School for the California Achievement test, junior high level in reading, arithmetic and language are presented in Tables 1-3. One of the concerns that was expressed during the testing period was that the junior high level might be too difficult for these students and that low scores would have little or no meaning. However, there were only nine percent of the students who scored at or below a chance score of 32 on the language test, only 14% of the students who scored at or below a chance score of 30 on the arithmetic test, and 23% of the students who scored

TABLE 1

Intermountain Indian School Norms

CALIFORNIA ACHIEVEMENT TEST
READING

Raw Score	Standard Score	%ile Rank	Raw Score	Standard Score	%ile Rank
101,above	73	99	52	49	55
97-99	72	98	51	48	54
92-96	70	97	50	48	53
87-91	68	96	49	47	51
86	66	95	48	47	49
85	65	94	47	46	46
82-84	64	93	46	46	44
79-81	63	92	45	45	42
78	62	91	44	45	40
77	62	90	43	44	38
76	61	89	42	44	35
75	61	88	41	43	34
74	60	86	40	43	31
73	60	84	39	42	28
71-72	59	83	38	42	25
70	58	81	37	41	23
69	58	80	36	41	21
68	57	79	35	40	18
67	57	78	34	40	17
66	56	77	33	39	16
65	56	76	32	39	15
64	55	75	31	38	13
63	55	74	30	38	12
62	54	71	29	37	10
61	54	69	28	37	9
59-60	53	67	27	36	7
58	52	66	26	36	6
57	52	64	25	35	5
56	51	63	23-24	34	3
55	50	61	20-22	33	3
54	50	57	1-19	32	1
53	49	56			

TABLE 2

Intermountain Indian School Norms

CALIFORNIA ACHIEVEMENT TEST
ARITHMETIC

Raw Score	Standard Score	%ile Rank	Raw Score	Standard Score	%ile Rank
90	75	99	49	51	60
87-89	73-74	98	48	51	58
82-86	71-72	97	47	50	56
80-81	69	96	46	49	54
77-79	68	95	45	49	52
75-76	67	94	44	48	50
74	66	93	43	48	48
73	65	92	42	47	46
72	65	91	41	46	44
71	64	90	40	46	41
70	64	89	39	45	40
69	63	88	38	45	37
68	62	87	37	44	34
67	62	86	36	44	31
66	61	85	35	43	28
65	61	84	34	42	25
64	60	83	33	42	22
63	59	82	32	41	18
62	59	81	31	41	15
61	58	80	30	40	14
60	58	78	29	39	12
59	57	77	28	39	10
58	56	76	27	38	9
57	56	74	26	38	7
56	55	71	25	37	6
55	55	70	24	36	5
54	54	69	22-23	35	4
52-53	53	65	19-21	34	3
51	52	63	17-18	33	2
50	52	61	1-16	32	1

TABLE 3

Intermountain Indian School Norms

CALIFORNIA ACHIEVEMENT TEST
LANGUAGE

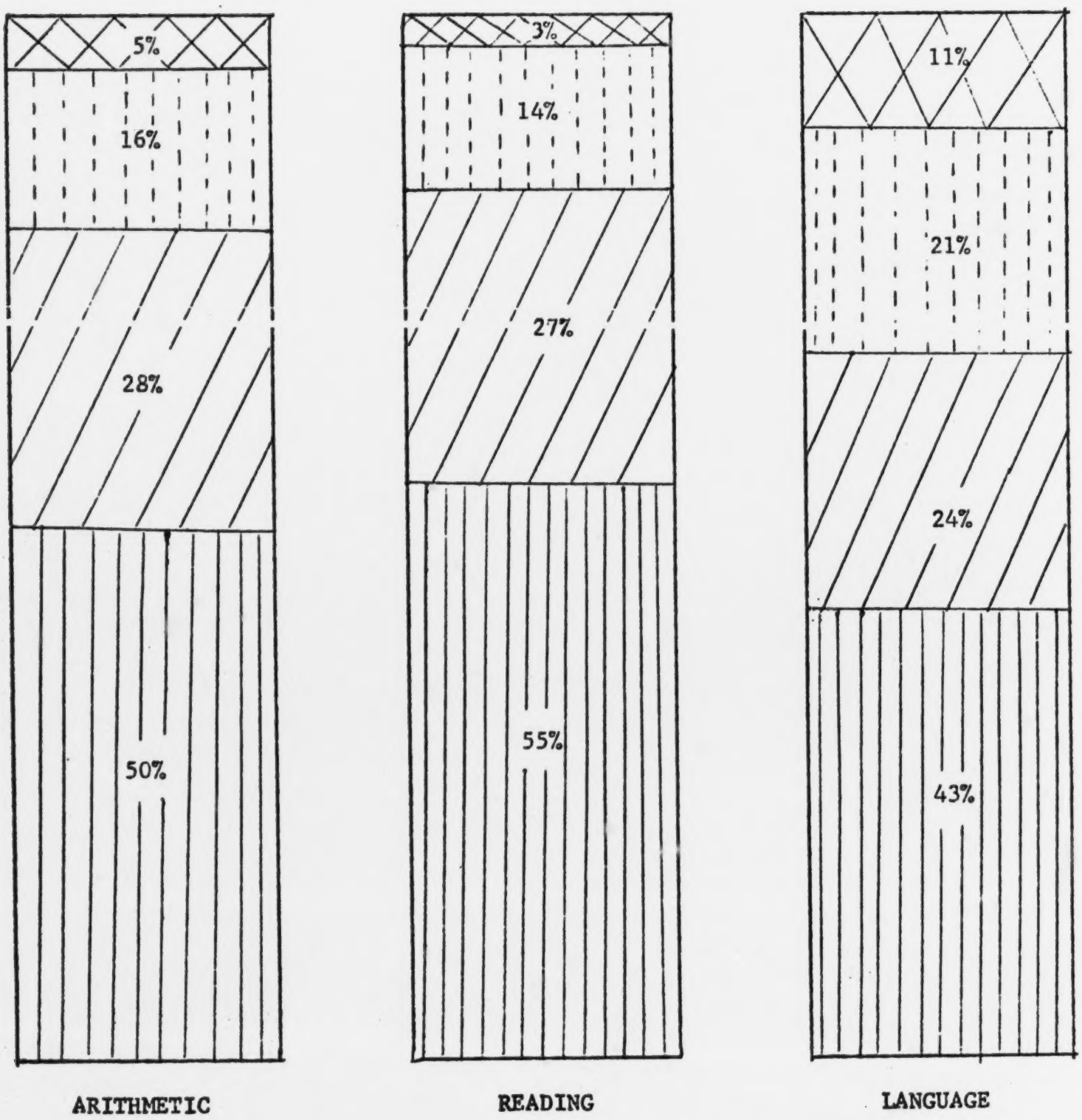
Raw Score	Standard Score	%ile Rank	Raw Score	Standard Score	%ile Rank
105 & above	68	99	61	49	45
102-104	67	98	60	48	44
99-101	65	97	59	48	41
98	65	96	57	47	40
97	64	95	56	47	39
94-96	63	93	55	46	37
92-93	62	92	54	46	35
91	62	90	53	45	34
90	61	89	52	45	33
89	61	88	51	44	31
88	60	86	50	44	30
87	60	85	49	44	29
86	60	83	48	43	28
85	59	82	47	43	27
84	59	81	46	42	26
83	58	80	45	42	25
82	58	78	44	41	24
81	57	75	43	41	23
80	57	74	42	40	22
79	57	72	41	40	20
78	56	71	40	40	18
77	56	70	39	40	17
76	55	69	38	39	16
75	55	68	37	39	14
74	54	67	36	38	13
73	54	65	35	38	12
72	53	64	33-34	37	11
71	53	63	32	36	9
70	52	61	31	36	8
69	52	60	30	35	7
67-68	51	57	28-29	34	6
66	51	54	26-27	33	5
65	50	51	24-25	33	4
64	50	49	18-23	31	3
63	50	48	8-17	28	2
62	49	47	1- 7	27	1

FIGURE I

Percentage of Intermountain Indian School Students for the California Achievement Tests who scored within quartiles derived from National Norms of entering seventh graders.

KEY
(Quartile Ranks)

Highest
Next Highest
Next Lowest
Lowest



ARITHMETIC READING LANGUAGE

FIGURE II

Percentage of Intermountain Indian School Students for the Cattell, Raven, and Lorge Thorndike Tests who scored within quartiles derived from National Norms of 14 year olds.

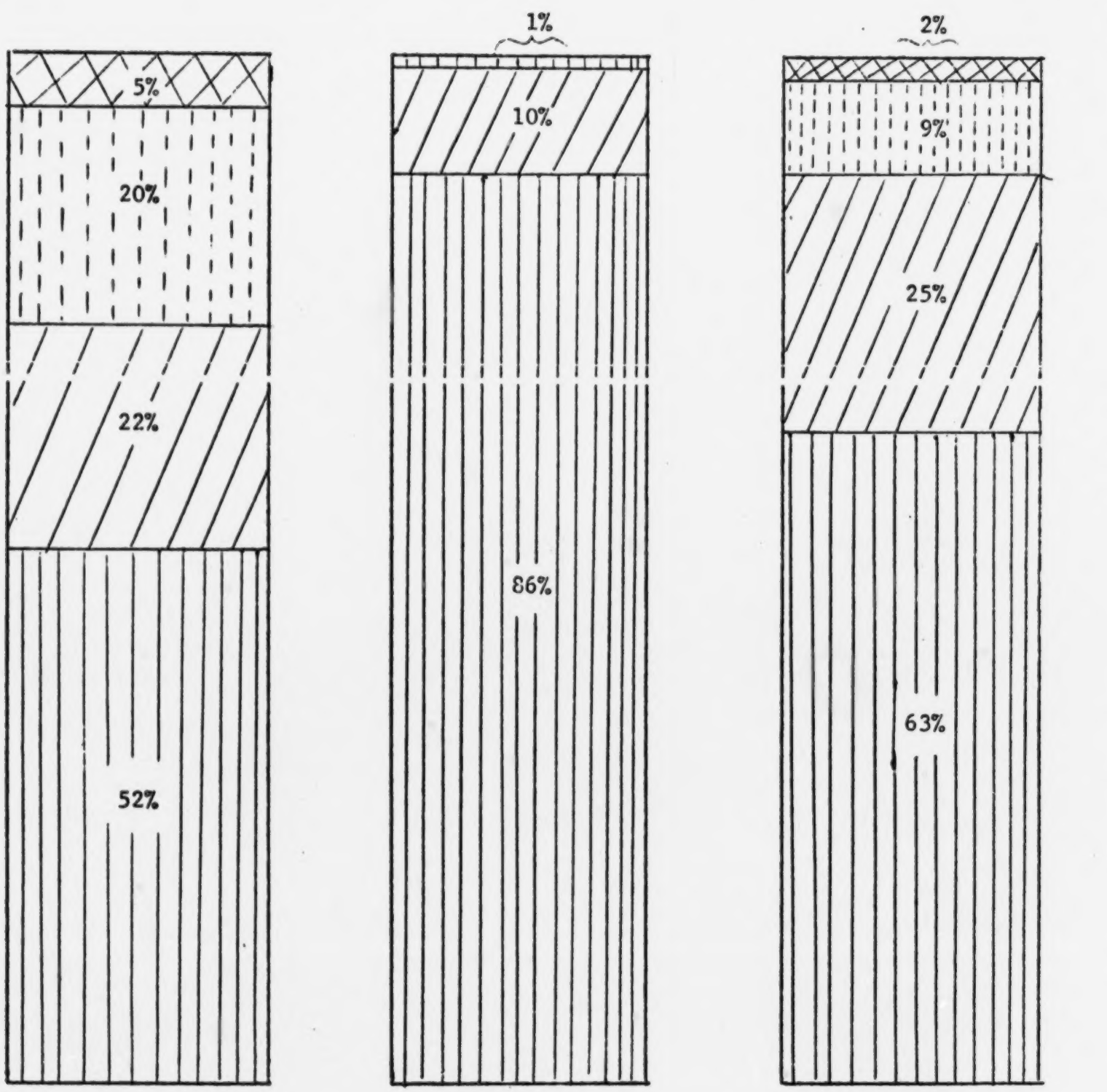


TABLE 4

Intermountain Indian School Norms

LORGE THORNDIKE INTELLIGENCE TESTS

%ile Rank	Raw Score	%ile Rank	Raw Score
99	69 & above	56	37
98	67-68	53	36
97	64-66	51	35
96	62-63	50	34
95	61	48	33
94	60	46	32
93	59	41	30-31
92	58	39	29
90	57	38	28
89	56	35	27
88	54-55	33	26
87	53	32	25
86	52	27	24
84	51	23	23
82	50	21	22
80	49	18	21
78	48	15	20
76	47	12	19
75	46	10	18
73	45	9	17
70	44	7	16
68	43	6	15
65	42	4	14
64	41	3	13
62	40	2	11-12
59	39	1	1-10
58	38		

TABLE 5

Intermountain Indian School Norms

RAVEN

%ile Rank	Raw Score	%ile Rank	Raw Score
99	49 and above	31	29
98	48	29	28
97	47	26	27
95	46	24	26
93	45	22	25
90	44	20	24
87	43	17	23
83	42	16	22
78	41	14	21
72	40	13	20
68	39	12	19
63	38	11	18
58	37	9	17
54	36	8	16
50	35	6	15
45	34	4	14
42	33	3	13
39	32	2	12
37	31	1	1-11
33	30		

TABLE 6

Intermountain Indian School Norms

CATTELL CULTURAL FAIR INTELLIGENCE TEST

%ile Rank	Raw Score	%ile Rank	Raw Score
99	69 and above	31	41
98	68	30	40
97	66-67	29	39
95	65	28	38
94	64	26	37
92	63	25	36
90	62	24	35
87	61	23	34
84	60	22	33
82	59	20	32
79	58	18	31
76	57	17	30
72	56	16	29
69	55	15	28
66	54	14	26-27
63	53	13	25
61	52	11	24
60	51	10	23
58	50	9	22
55	49	8	21
48	47	7	20
46	46	5	19
44	45	4	17-18
40	44	3	15-16
37	43	2	14
33	42	1	1-13

at or below a chance score of 27 on the reading test. From this data, it would appear that the junior high level battery may be an appropriate battery for these students. The majority of these students are 14 or older and hence should be placed in at least ninth grade if they were placed according to chronological age. But the results of the achievement test, when compared with publishers norms, indicate that these students still score poorly even as seventh graders with approximately 50% of the students falling in the lowest quartile of publishers norms for beginning seventh grade students (Figure I).

Scholastic Aptitude Tests. The norms for the scholastic aptitude tests (Tables 4-6) are based only on those new and re-returning students who are 14 or older. When the results of the I.Q. tests are compared with publishers norms for 14 year olds, the students at Intermountain are much lower on both the culture fair and culture bound tests. The verbal section of the Lorge Thorndike was used as a culture bound test and these results indicate that almost all of the students scored in the bottom half of publishers norms on the Lorge Thorndike (Figure II). This would lead either to a conclusion that the students are well below the average in scholastic ability or that the test has not adequately assessed their scholastic ability. The results on the culture fair tests, (Cattell and Raven) are closer to national norms and also similar to each other. Since the results of these two tests are alike and the Lorge Thorndike is quite different from these, it would appear that the Lorge Thorndike is probably not a good measure of scholastic aptitude for this population. It is recommended that it not be considered as a test to measure scholastic aptitude with Navajo Indian Students.

The performance of the Indian students on the culture fair tests is still low enough, however, to infer that the population of students presently attending the Intermountain School have lower intellectual ability than an unselected group of 14 year olds.

The Goodenough-Harris Draw-A-Person test was given to the full sample of 9th grade students as a possible non-culture bound I.Q. test. However, it appeared to the test examiners that the test may be more a measure of motivation and interest since many students resisted drawing the figures, and when urged to finish, they scratched out rather hurried, poorly done drawings. The investigators hypothesized that the test would not prove valid as a measure of scholastic aptitude but may be a measure of the apparent natural art aptitude of the Navajo 9th grade student.

The above hypothesis was tested by scoring the top and bottom twenty-five Draw-A-Person responses as judged by a visual sort. These scores were then correlated with the scores on the Cattell. The Pearson Product-moment and the point biserial correlation coefficients are probably inappropriate statistics for this sample and probably yield spuriously high coefficients. Since no appropriate statistic was available, both of these measures were used to estimate the degree of relationship with the following results: $r = .39$, $r_{pt\ bis} = .49$.

Another estimate of the degree of correlation was made by considering the two groups of drawing scores separately. When this was done, the following correlation coefficients between the Goodenough-Harris and the Cattell were obtained: High Scorers $r = -.12$, Low Scorers $r = .01$.

Using the entire sample of scored Goodenough-Harris tests yields spuriously high results, and using each group separately yield spuriously

low coefficients (because of the fruncated range). Therefore it is most probable that the true r is small and not significantly different from a zero order correlation.

Because of the low correlation, the possibility of other than a linear relationship (-.12 at upper end) and the attitude of some students in taking the test, it is recommended that the Goodenough-Harris not be used as a test for measuring scholastic aptitude.

Tennessee Self Concept Scale. The investigators decided to determine if the above measure might be a worthwhile group personality instrument since it had been reported that this scale has been successfully used to diagnose personality problems when administered individually through an interpreter. It became readily apparent upon administration that the results would be questionable. Many students responded by randomly or systematically marking the answer sheet with no regard to the questions. Examination of the response patterns verified this and it was decided that the test would not be useful in a group administration as a diagnostic personality instrument.

Achievement Test Data: Pre-Post Comparison. The California Achievement Test was given in the Fall and Spring, 1969-70 school year. An examination of the data presented in Table 7 shows that the average growth of the students tested was 0.3, 0.6, and 0.4 grade equivalents on the Arithmetic, Reading, and Language sub-tests respectively. The time that elapsed between the two testings was approximately seven-tenths of the school year, so the normal growth during this time should be 0.7 grade equivalents. In Reading the students approached but did not reach the normal growth rate and in the other two areas the growth is at approximately

half the normal rate. This rate of achievement, correlates with the results of the scholastic aptitude tests and confirms the position that the students tested to represent a sample in need of special education facilities.

TABLE 7

CALIFORNIA ACHIEVEMENT PRE-POST COMPARISON

CAT Arith.	GE	Mean	S.D.	r	t
Pre	6.7	49.62	16.13	.72	5.85
Post	7.0	57.19	17.62		
CAT Read.					
Pre	6.0	54.87	17.45	.76	7.10
Post	6.6	63.74	18.11		
CAT Lang.					
Pre	6.6	66.01	19.95	.69	3.75
Post	7.0	72.19	20.36		

Analysis of Prediction Data for School Placement. One of the purposes of Project In/Slip was to determine if an equation for predicting student achievement could be developed that would serve as a better placement instrument for Indian students than the present system which utilizes only the Reading test of the California Achievement Test Battery. Two scholastic aptitude tests were added to the CAT battery (Cattell Culture Fair Test and Raven Progressive Matrices). The resultant correlation matrix is presented in Table 8. Tables 9, 10, 11, and 12 present the step-wise regression analysis of the Spring CAT Total, Arithmetic, Reading, and Language scores

respectively. Table 13 presents the order of variable deletion when predicting the total CAT Spring scores and each sub-test Spring score. Examination of this table reveals that the Raven Progressive Matrices appears to consistently contribute very little to the prediction equation. From close examination of Tables 9, 10, 11, and 12 it would appear that the Raven's could be dropped from the prediction battery without reducing significantly the prediction value obtained. Each fall test score was the last remaining variable when predicting the corresponding spring variable. The variable that most consistently remained the longest was the Language test. The regression coefficients are presented in Table 14. Note that the Raven's Progressive Matrices has been dropped as a predictor.

TABLE 8

CORRELATION MATRIX

	$F_{Arith.}$	$F_{Read.}$	$F_{Lang.}$	Raven	Cattell	$S_{Arith.}$	$S_{Read.}$	$S_{Lang.}$	S_{Total}
$F_{Arith.}$	1.00								
$F_{Read.}$	.70	1.00							
$F_{Lang.}$	.58	.64	1.00						
Raven	.39	.26	.37	1.00					
Cattell	.28	.19	.27	.46	1.00				
$S_{Arith.}$	.72	.53	.58	.39	.32	1.00			
$S_{Read.}$	.62	.76	.65	.40	.35	.61	1.00		
$S_{Lang.}$	.57	.59	.68	.34	.35	.74	.67	1.00	
S_{Total}	.71	.71	.72	.42	.38	.88	.92	.86	1.00

F = Fall Testing S = Spring Testing

TABLE 9

STEP-WISE REGRESSION ANALYSIS OF SPRING CAT
TOTAL SCORES

Variables Included	R^2
F_{Arith}, F_{Read}, F_{Lang}, Raven, Cattell	.70.26
F_{Arith}, F_{Read}, F_{Lang}, -----, Cattell	.70.00
F_{Arith}, F_{Read}, F_{Lang}, -----, -------	.67.73
F_{Arith}, -----, F_{Lang}, -----, -------	.65.26
------, -----, F_{Land}, -----, -------	.52.41

TABLE 10

STEP-WISE REGRESSION ANALYSIS OF SPRING CAT
ARITH SCORES

Variables Included	R^2
F_{Arith}, F_{Read}, F_{Lang}, Raven, Cattell	57.46
F_{Arith}, -----, F_{Lang}, Raven, Cattell	57.34
F_{Arith}, -----, F_{Lang}, -----, Cattell	57.03
F_{Arith}, -----, F_{Lang}, ----, -------	56.18
F_{Arith}, -----, -----, ------, ------	52.06

TABLE 11

STEP-WISE REGRESSION ANALYSIS OF SPRING CAT READ SCORES

Variables Included	R^2
F_{Arith}, F_{Read}, F_{Lang}, Raven, Cattell	.6677
------, F_{Read}, F_{Lang}, Raven, Cattell	.6676
------, F_{Read}, F_{Lang}, -----, Cattell	.6587
------, F_{Read}, -----, -----, Cattell	.6319
------, F_{Read}, -----, -----, -------	.5885

TABLE 12

STEP-WISE REGRESSION ANALYSIS OF SPRING CAT LANG. SCORES

Variables Included	R^2
F_{Arith}, F_{Read}, F_{Lang}, Raven, Cattell	.5453
F_{Arith}, F_{Read}, F_{Lang}, -----, Cattell	.5453
------, F_{Read}, F_{Lang}, -----, Cattell	.5363
------, F_{Read}, F_{Lang}, -----, -------	.5099
------, -----, F_{Lang}, -----, -------	.4710

TABLE 13

ORDER OF VARIABLE DELETION

	Total	Arith.	Read.	Lang.
$F_{Arith.}$	4	5	1	2
$F_{Read.}$	3	1	5	4
$F_{Lang.}$	5	4	3	5
Raven	1	2	2	1
Cattell	2	3	4	3

TABLE 14

REGRESSION COEFFICIENTS

	Constant	$F_{Arith.}$	$F_{Read.}$	$F_{Lang.}$	Cattell
To Predict					
Total	25.1992	.8701	.7315	.8768	.5819
Arith.	8.1145	.6424	-.0606	.2257	.1224
Read.	5.7036	.0521	.5895	.1888	.2317
Lang.	11.3811	.1756	.2026	.4623	.2277

Summary

The objectives of this part of Project In/Slip were to: 1) Establish normative data for Navajo Indian ninth grade students at Intermountain School on scholastic aptitude, achievement and personality tests; 2) To ascertain the reliability of the Tennessee Self-Concept Scale as a group personality instrument; 3) To determine the predictive validity of an achievement and ability test combination relative to end of school scores on the Achievement test; 4) To determine areas where the present curriculum may be weak when compared within Intermountain School; 5) To create a student profile sheet containing the reliable data obtained on the sample investigated in this study.

Tests were administered to achieve the objectives indicated, a student profile sheet was constructed, student results posted, and the profile sheets given to the Intermountain School.

Additional results were:

1) While the majority of students tested were 14 years or older and hence should be placed in the 9th grade according to chronological age, 50 percent of the students fell in the lowest quartile of publishers norms for beginning seventh grade students.
2) The Tennessee Self Concept Scale proved unreliable as a group personality test for the sample tested.
3) A regression equation was developed using both achievement and scholastic aptitude test scores.
4) The pre-post achievement test (CAT) revealed that the academic growth in language, arithmetic and reading was less than the expected academic growth of a normal group.

5) Of the scholastic aptitude tests investigated, the Cattell Culture Fair test appears to be the most appropriate instrument for the 9th graders at Intermountain. Even though the sample most nearly approached the norm group on this test, the student performance was still low enough to infer they have lower intellectual ability than an unselected group of 14 year olds.

Implications

The results of this investigation indicate that Intermountain School is attempting to educate 9th grade students who not only have a language and cultural barrier but also constitute in substantial numbers students who would classify as special education students in typical schools. It therefore would appear that immediate action should be taken to employ special education methods throughout the school.

It is further recommended that guidance of 9th grade students be accomplished by utilizing the local norms in order that the students' relative standing be compared with his own peer group. This procedure should help alleviate comparing the student with a culture for which he is not yet ready. Related to the above, it is recommended that the academic achievement prediction equation be experimentally tested for validity on the 1970-71 or 1971-72 ninth grade students. If this is not done, the improvement of placement procedures for which this study was partially designed, will not bear fruition.

II. Vision, Speech, and Hearing Evaluation

Introduction

This is the second part of a two part report on project In/Slip. This section of the report covers the speech, hearing, and vision results.

Purpose and Objectives

The communicative process is the critical process in any student - teacher interaction and the student who has a basic communicative handicap will reflect this in other dimensions of academic performance. For this reason, the objectives of this phase of the study were formulated to evaluate the communicative difficulty of Indian children. Specifically, the objectives were:

1. To evaluate the phonological capacity of the students.
2. To assess the recognition vocabulary of the students.
3. To screen the population for hearing difficulty.
4. To determine incidence of visual dysacuity in the new and re-returnee Indian students.

Sample

The sample used in this study was composed entirely of new and re-returnee students at the Intermountain Indian School, Brigham City, Utah. Initially, plans were made to screen all these new and re-returnee students, but a final company of students was enrolled after our examination team had been disbanded. As a consequence of this, only 325 new and re-returnee students were seen for this evaluation. However, this constitutes a large enough sample to support generalizations which are made.

Method and Design

Several instruments were used to conduct the evaluations. They were

as follows:

1. Templin-Darley Tests of Articulation (T-D). This test describes and evaluates an individual's production of speech sounds of language. The 50 item screening test was used. In most instances, but not in all cases, it was necessary for the examiner to read the words to the student and have him repeat them. Many of the subjects had reading difficulties and so reading of the stimulus words could not be used. Additionally, many of the subjects presented difficulty identifying the pictorial stimuli and so the picture test could not routinely be administered. Since the norms are from 3-8 years of age and all the subjects were beyond this upper line, it was assumed that subjects in this study should have normal articulatory skills.

2. Peabody-Picture Vocabulary Test (Form A and B) (PPVT). This test is designed as an estimate of a subject's "verbal intelligence" through measuring his recognition vocabulary. The test instrument is simple to administer and score. The test consists of 150 plates of pictures each containing four different pictures. The subject is required to indicate by any means the picture which is most appropriately related to the word spoken by the examiner. Though the test is designed to measure "verbal intelligence" the principle use of it in this study was to estimate the subject's comprehension of the spoken word.

3. Pure tone, air conduction, audiometric threshold test. A Rudmose ARJ-4A audiometer was used to determine the subject sensitivity to pure tones. Subjects were oriented in groups of five and time was allowed for questioning. Then each one was seated at the audiometer and headphones were affixed and the master set introduced the pure tones. The individual

had a hand switch which controlled the attenuation of the signal. When the subject first heard the sound, he was instructed to depress the switch which individually attenuated the signal. Criterion for failure was a loss of 25 dB in any frequency in either or both ears.

4. Vision screening. This was accomplished by using the Snellen eye chart. All vision examiners had a pre-study training session with the consulting opthamologist. Criterion for failure was more than two misses on any of the lines below the red line (20/20, 20/25, 20/30) or more than one error between the red and green lines (20/40, 20/50). Additionally, the plus 1,2,3 diopter lenses were used to determine distance vision problems.

The testors were all graduate students in the Department of Audiology-Speech Pathology, Utah State University, with the exception of the vision testors. All had had previous training and experience in the administration of the tests used in the study.

Analyses

The data derived from the tests were analyzed for measures of central tendency and percentages observed in the various categories of performance. The data on hearing and vision are presented as pass-fail percentages. The articulation data were analyzed both in terms of pass-fail and also the number making certain types of errors. Raw scores on the PPVT were converted to mental age scores.

Results and Discussion

The results of the testing done for project In/Slip will be presented in the following order: 1) Articulation, 2) Vocabulary, 3) Hearing, and 4) Vision.

1. Articulation. A total score of 50 points was possible on this

examination. The mean score was 48.3 and a standard deviation of 12.4 was computed. This variability reflects the extremely low scores obtained by relatively few students. It was assumed that adults would perform at maximum and any scores obtained below 50 would reflect an articulatory problem. The high mean score obtained can be compared to the published norms, but in the interpretation of this it must be remembered that the upper age limit of the norm tables is 8 years of age. The published mean is 47.8 with an SD of 4.4.

An inspection of figure 3 reveals that only 42% of the population had errorless speech.

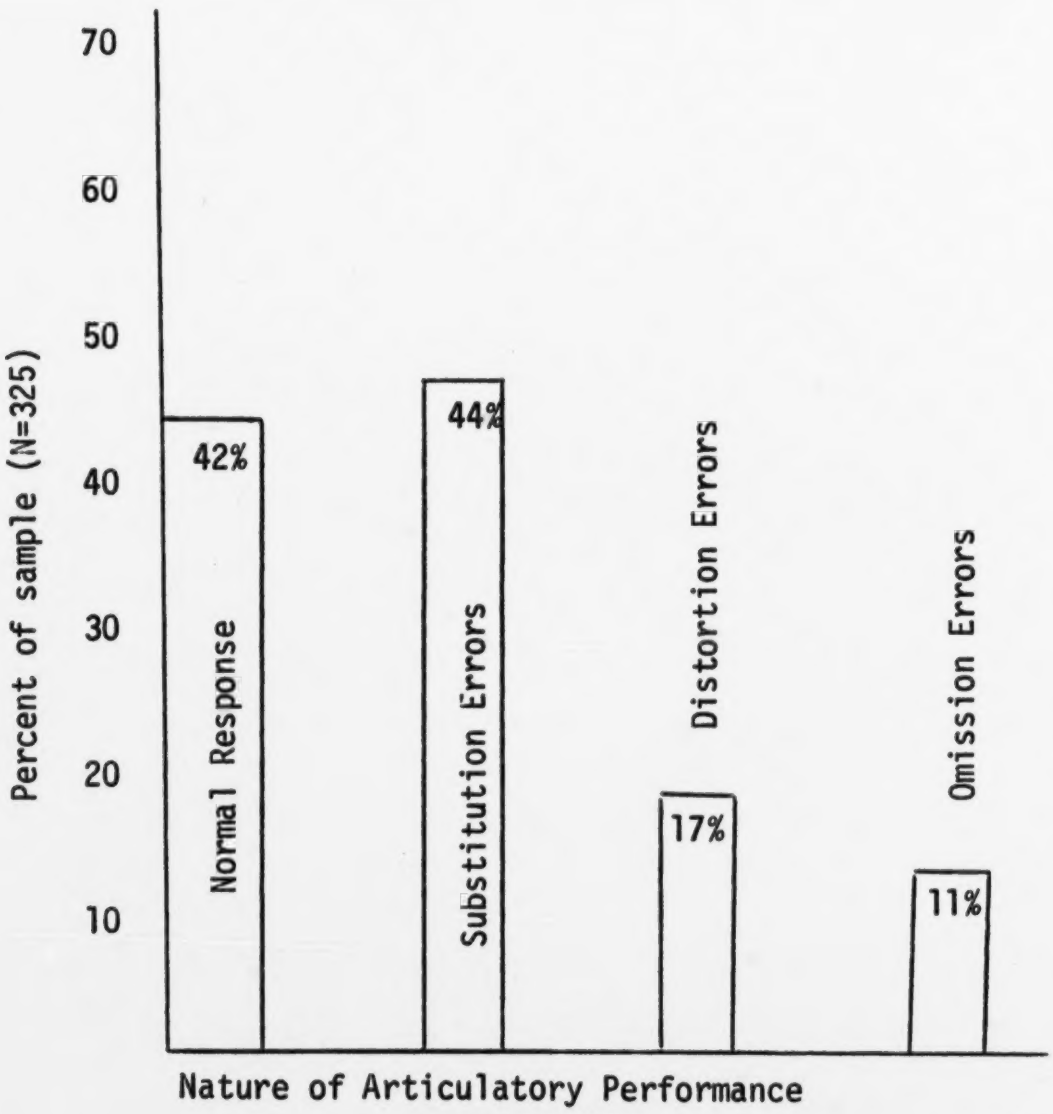


Figure 3. Percentage of subjects demonstrating different articulatory responses.

Fourty-four percent of the subjects made substitution errors; seventeen percent made distortion errors, and eleven percent made omission errors. Some of the cases made more than one type of error, but the important result is that a high proportion of the sample population made errors in production of the sounds of English. This finding is even more dramatic when one considers that in most cases a model of the correct production was furnished the subject prior to his response.

Though an item analysis was not performed on the articulatory test data, it is apparent that most of the errors related to difficulty on but few phonemes of English. Commonly the /θ/ and /ð/ were made in error. The usual substitutes were /t/ and /d/ respectively although /f/ and /v/ were also widely used. Another common error occurred on the er-vowel sound /3/. Though no acoustical analysis was made of the usual production, it appeared to the writer that the primary difference was durational in nature rather than a segmental difference.

2. Peabody Picture Vocabulary Test. Raw scores were converted to mental age and where possible into IQ scores and percentile scores. Since it was not universally possible to obtain the percentile and IQ scores by using the standard test protocol, the mental age (MA) was used as the single score representing comprehension of the spoken words of English. According to the expanded manual "Age equivalents provide an index of the level of development for a given subject". (Dunn, 1965) Thus, a derived MA is an index of the individual's developmental level irrespective of his chronological age. Additionally, by using MA one can employ the rule of five and determine approximate grade equivalents. That is an MA of 11.0 would reduce to a grade level of six.

The mean MA computed for this group was 7-4. No attempt was made to compute the variability, but on inspection of the data, very few high scores were observed and very few extremely low scores were observed. The range was from 1-11 to 18-0. No attempt was made to correlate these data with any of the other measures used. By inspection it was obvious that no positive relationship existed between the MA and articulation; for example, the subject with an MA of 1-11 had only 1 misarticulated sound while one of two subjects scoring above her CA made 5 errors in speech sound production.

The test protocol was followed, but in many cases it was felt by the examiners that the stringent application of ceiling (6 errors in 8 consecutive responses) unduly penalized many of the subjects who just did not know the English words.

In most instances the examiners felt that the subjects were brighter and were able to perform better than their test scores indicated. Generally, it is the opinion of this writer that the PPVT does not yield data which are useful in determining either grade placement or possible scholastic success. Correlational studies with part I of this study should be attempted.

3. Pure tone air conduction threshold testing. Only 308 (95%) of the 325 subjects were tested. The only explanation for this is that the two test areas were widely separated and there was ample opportunity for the subjects to avoid taking the hearing test. Figure 4 reveals the data obtained on hearing testing.

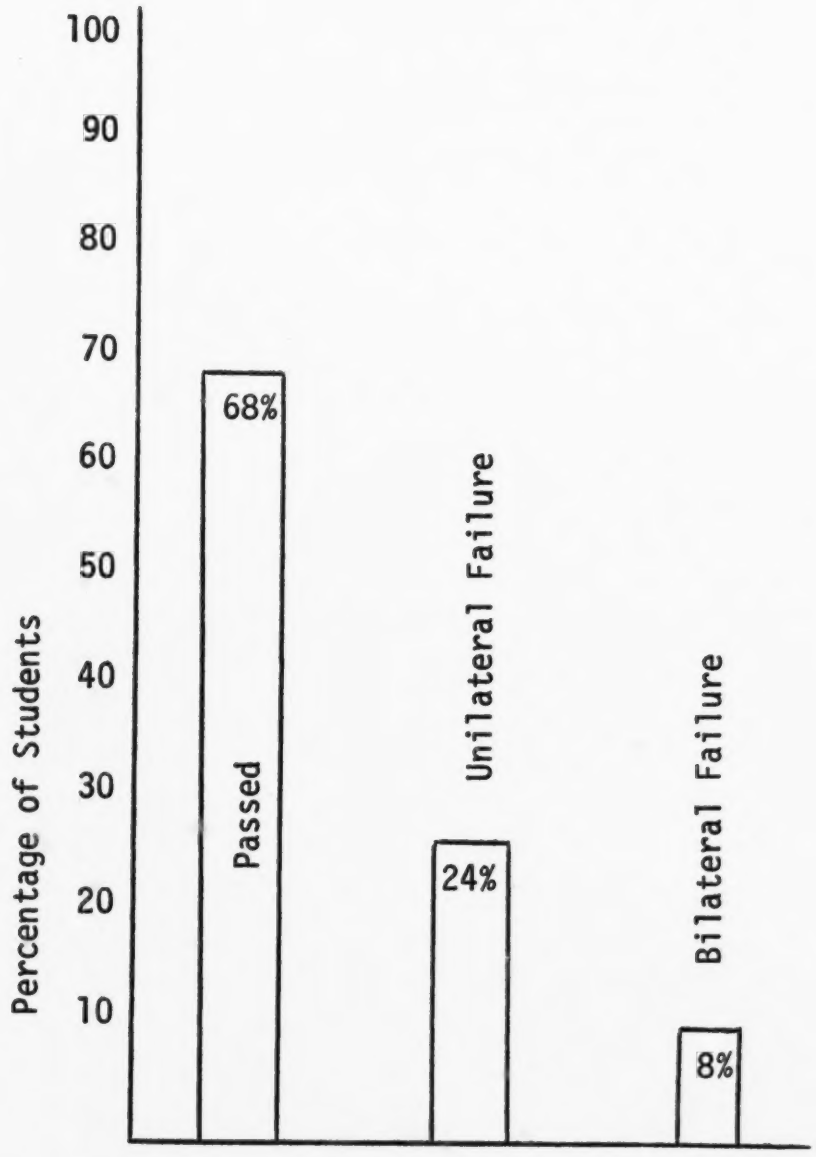


Figure 4. Percentage of students passing or failing pure tone threshold testing.

It is to be remembered in evaluating these data that these are threshold data not screening data. Thus, 32% of the population demonstrated medically significant losses. No threshold by frequency comparisons have been made, but it is readily apparent that the incidence of educationally and medically significant losses exceeds that of the normal population many times.

The educational impact of hearing loss is a well documented fact and for this significant part of the population (32%) it may be that hearing loss plays an important part in their achievement scores and other academic

and social performance areas. It also points out the need for routine reservation care and a carefully controlled program of hearing conservation at the Intermountain Indian School.

4. Vision Screening. The purpose of this section of the study was to determine the incidence of visual dysacuity in the new and re-returnee Indian students at the Intermountain Indian School, Brigham City, Utah.

Vision screening was accomplished using the Snellen Eye Chart and plus 1, 2, 3, diopter lenses for distance vision problems. The testers were all lay people trained for this specific task by Dr. Robert Jensen, the consulting opthamologist. After the completion of testing a follow-up sample was tested by the vision consultant to determine the reliability of our testers. No reliability coefficients were computed but the observation of the testers' results as reported by the opthamologist was as follows:

> In comparing the data that I obtained on the selected students with the data obtained by the vision testing team, I would say that in general a rather good job was done by your team. There were two or three cases that I checked where a significant difference was obtained with that of a member of your vision team, but in all cases my examination showed slightly better vision than they recorded and the only problem this would create would be a few extra referrals but nothing very significant. (personal correspondence, Jensen, 1970)

In essence the results of this phase of the project were:

1. Three hundred and forty-five students were screened for vision. Many of the students reported that their glasses were lost or broken and so only their vision without glasses is reported. Interestingly, on the sample recheck by Dr. Jensen, a number of the students initially reporting glasses broken or lost had glasses on retest. Upon questioning, it was apparent that the students had initially deceived the testing team.

2. Of the 345 students screened, 61 percent had significant visual acuity deficits. Some of these are adequately corrected with glasses, but from the results of the screening, fifty-three percent (185) students have a significant visual acuity defect that does not appear to be adequately corrected by glasses. Ninteen of the 47 students who were tested with glasses appear to have visual deficit not adequately corrected by glasses.

The screening for hyperopia with the plus lenses appears to have given quite accurate data. Of the 345 students tested, 13 percent performed better with the plus lenses and, according to the opthamologist, were indeed hyperopic.

Though no attempt has been made in this study to provide correlational data between visual sensory deficit and academic performance, it is known that a child does suffer educational impact from visual deficit. The large number of children demonstrating visual deficit, the large number reporting lost or broken glasses, and the large number inadequately corrected by glasses, would suggest that at least part of the educational problem with the Intermountain School population has some relationship with visual acuity. Adequately correcting all visual deficits will not solve the academic problems, but adequate correction should insure optimal visual participation in the academic effort.

Summary

The purposes of this part of the In/Slip project were to: 1) Identify articulatory problems of this population of students; 2) Assess comprehension ability of English words; 3) Evaluate acuity for pure tone air-conducted sounds; and 4) Measure the visual acuity. Tests were administered to

achieve the measures indicated and the results demonstrate clearly that in each instance (except vision which is yet to be tabulated) the subjects of this study performed below available normative data. This is not unexpected; however it remains to determine the relationship of these variables with others such as school achievement, personality measures etc. Normative data of Indian children's performance on the PPVT may be helpful, but the instrument is so culture bound that relatively little can be gained by using it as a predictive or diagnostic tool. Hearing conservation programs both on the reservation and at the boarding schools are indicated by the percentage of hearing losses identified within this population.

From this study it is apparent that there exists in many of these students a communicative handicap. The effect of that handicap is in all probability related to their performance in other areas. However, the strength of this relationship needs to be determined.

APPENDICES

APPENDIX I

STAFF CONDUCTING THE STUDY

Michael R. Bertoch, Ed.D. Associate Professor, Psychology and Acting Coordinator of Counseling Psychology Programs Utah State University	Co-Director
Jay R. Jensen, Ph.D. Professor & Head, Dept. of Communicative Disorders Utah State University	Co-Director
Keith T. Checketts Associate Professor, Psychology & Ass't Director Counseling & Testing Utah State University	Psychological Test Consultant
Steven Viehweg, Ph.D. Assistant Professor, Dept. of Communicative Disorders Utah State University	Consultant for Audio Testing
Robert Jensen, M.D.	Vision Consultant

APPENDIX II

PROJECT IN/SLIP
TESTING SCHEDULE

I. Key

A. Groups

1. 20 groups of students - 30 students per group
2. 10 groups tested simultaneously

B. Time

1. Each group involved in six-one hour and fifteen minute blocks
2. Thus each series of ten groups would require 7½ hours of testing-or a total of 15 hours of testing for the entire group
3. Three days of testing for the entire group to take place September 22, 24, and 26
4. Blocks of Time

Block 1 - Sept. 22,	8:35 a -	9:50 a
" 2 - " "	9:55 a -	11:10 a
" 3 - " "	1:05 p -	2:20 p
" 4 - " "	2:30 p -	3:45 p
" 5 - Sept. 24,	8:35 a -	9:50 a
" 6 - " "	9:55 a -	11:10 a
" 7 - " "	1:05 p -	2:20 p
" 8 - " "	2:30 p -	3:45 p
" 9 - Sept. 26	8:35 a -	9:50 a
" 10 - " "	9:55 a -	11:10 a
" 11 - " "	1:05 p -	2:20 p
" 12 - " "	2:30 p -	3:45 p

II. SCHEDULE

APPENDIX II (Cont.)

GROUP	BLOCK 1	2	3	4	5	6	7	8	9	10	11	12
1	CAT-L	CAT-M					CAT-R	Ravens	Tenn-Catt	KA-GH		
2	CAT-M	CAT-R					Ravens	Tenn-Catt	KA-GH	CAT-L		
3	CAT-R	Ravens					Tenn-Catt	KA-GH	CAT-L	CAT-M		
4	Ravens	Tenn-Catt					KA-GH	CAT-L	CAT-M	CAT-R		
5	Tenn-Catt	KA-GH					CAT-L	CAT-M	CAT-R	Ravens		
6	KA-GH	CAT-L					CAT-M	CAT-R	Ravens	Tenn-Catt		
7	CAT-L	CAT-M					CAT-R	Ravens	Tenn-Catt	KA-GH		
8	CAT-M	CAT-R					Ravens	Tenn-Catt	KA-GH	CAT-L		
9	CAT-R	Ravens					Tenn-Catt	KA-GH	CAT-L	CAT-M		
10	Ravens	Tenn-Catt					KA-GH	CAT-L	CAT-M	CAT-R		
11			Ravens	CAT-L	Catt-Tenn	CAT-M					GH-KA	CAT-R
12			CAT-L	Catt-Tenn	CAT-M	GH-KA					CAT-R	Ravens
13			Catt-Tenn	CAT-M	GH-KA	CAT-R					Ravens	CAT-L
14			CAT-M	GH-KA	CAT-R	Ravens					CAT-L	Catt-Tenn
15			GH-KA	CAT-R	Ravens	CAT-L					Catt-Tenn	CAT-M
16			CAT-R	Ravens	CAT-L	Catt-Tenn					CAT-M	GH-KA
17			Ravens	CAT-L	Catt-Tenn	CAT-M					GH-KA	CAT-R
18			CAT-L	Catt-Tenn	CAT-M	GH-KA					CAT-R	Ravens
19			Catt-Tenn	CAT-M	GH-KA	CAT-R					Ravens	CAT-L
			CAT-M	GH-KA	CAT-R	Ravens					CAT-L	Catt-Tenn